

A

Work Order ID 101939

May-21-13 3:35:21 PM

\*101939\*

Item ID: D212-664-201TRN

Accept

\*N900040100\*

Setup Start \*NS1\*

Revision ID:

Stop \*NS2\*

Item Name: Crosstube Turning Detail

Start Date: 5/21/13 Start Qty: 1.00

\*1\*

Cust Item ID:

Required Date: 6/04/13 Req'd Qty: 1.00

\*1\*

Customer:

Reference:

Approvals: Process Plan: MLS Date: 130522 Tooling: \_\_\_\_\_ Date: \_\_\_\_\_  
QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Run Start \*NR1\*

Stop \*NR2\*

| Sequence ID/<br>Work Center ID | Operation<br>Description | Set Up/<br>Run Hours | Tool ID | Tool # | Plan<br>Code | Accept<br>Qty | Reject<br>Qty | Reject<br>Number | Insp.<br>Stamp |
|--------------------------------|--------------------------|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|
|--------------------------------|--------------------------|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|

| Draw Nbr     | Revision Nbr |
|--------------|--------------|
| D212-664-241 | Rev D        |

|     |  |      |
|-----|--|------|
| 100 |  | 0.00 |
|-----|--|------|

\*100\*

MORI SEIKI CNC LATHE LARGE

Mori Seiki

Memo

0.00

Mori Seiki CNC Lathe Large

1-Fill tube with sand & install plugs DT8534 on both ends as per Folio FA114

2-Turn first side as per Folio FA114

3-Blend transition lines only, \*\*do not sand whole tube\*\*.

FOLIO REV: AB

DWG REV: AB

\*Use mill bastard file, brush file repeatedly with file card.

\*Do not use sandpaper coarser than 320 grit.

1 Ø  
mm.L  
13/06/07

|     |  |      |
|-----|--|------|
| 110 | QC1- Inspect dimensions to dimension sheet | 0.00 |
|-----|--|------|

\*110\*

QC

Memo

0.00

Quality Control

1 Ø  
mm.L  
13/06/07

NCR: Yes / No

**WORK ORDER NON-CONFORMANCE / UPDATE**

DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA Closed: \_\_\_\_\_ Date: \_\_\_\_\_

|  |   |   |                                      |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
|--|---|---|--------------------------------------|------------------------------------|------------------------------------|--------------------------------------|------------------------------------|------------------------------------|--|----------------------------------|--|------------------------------------|--|--------------------------------|------------------------------------|------------------------------------|-----------------------------------|--|
| Work Order: _____<br><br>Part No. _____<br><br>NCR No. _____ | <b>DISPOSITION</b><br><br>Rework <input type="checkbox"/><br>Scrap <input type="checkbox"/><br>Use-as-is <input type="checkbox"/><br>Work Order Update <input type="checkbox"/> | <b>AGAINST DEPARTMENT/PROCESS</b><br><br><table style="width: 100%;"> <tr> <td>Skid-tube <input type="checkbox"/></td> <td>Crosstube <input type="checkbox"/></td> <td>Water Jet <input type="checkbox"/></td> <td>Engineering <input type="checkbox"/></td> </tr> <tr> <td>Machining <input type="checkbox"/></td> <td>Small Fab <input type="checkbox"/></td> <td>Prod. Eng. Coord. <input type="checkbox"/></td> <td>Quality <input type="checkbox"/></td> </tr> <tr> <td>Thermoforming <input type="checkbox"/></td> <td>Finishing <input type="checkbox"/></td> <td>Rec/Store/Packaging <input type="checkbox"/></td> <td>Other <input type="checkbox"/></td> </tr> <tr> <td>Large Fab <input type="checkbox"/></td> <td>Composite <input type="checkbox"/></td> <td>Supplier <input type="checkbox"/></td> <td></td> </tr> </table> | Skid-tube <input type="checkbox"/>   | Crosstube <input type="checkbox"/> | Water Jet <input type="checkbox"/> | Engineering <input type="checkbox"/> | Machining <input type="checkbox"/> | Small Fab <input type="checkbox"/> | Prod. Eng. Coord. <input type="checkbox"/> | Quality <input type="checkbox"/> | Thermoforming <input type="checkbox"/> | Finishing <input type="checkbox"/> | Rec/Store/Packaging <input type="checkbox"/> | Other <input type="checkbox"/> | Large Fab <input type="checkbox"/> | Composite <input type="checkbox"/> | Supplier <input type="checkbox"/> |  |
| Skid-tube <input type="checkbox"/>                           | Crosstube <input type="checkbox"/>  | Water Jet <input type="checkbox"/>  | Engineering <input type="checkbox"/> |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Machining <input type="checkbox"/>                           | Small Fab <input type="checkbox"/>  | Prod. Eng. Coord. <input type="checkbox"/>  | Quality <input type="checkbox"/>     |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Thermoforming <input type="checkbox"/>                       | Finishing <input type="checkbox"/>  | Rec/Store/Packaging <input type="checkbox"/>  | Other <input type="checkbox"/>       |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Large Fab <input type="checkbox"/>                           | Composite <input type="checkbox"/>  | Supplier <input type="checkbox"/>   |                                      |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |

| Root Cause    | Date | Step | Qty | Description of work order update or Non-conformance | Initial Chief Eng | Action Description | Sign & Date | Verification | QC Inspector |
|---------------|------|------|-----|---|-------------------|--------------------|-------------|--------------|--------------|
| Doc/Data      |      |      |     |   |                   |                    |             |              |              |
| Equip/Tooling |      |      |     |   |                   |                    |             |              |              |
| Operator      |      |      |     |   |                   |                    |             |              |              |
| Material      |      |      |     |   |                   |                    |             |              |              |
| Setup         |      |      |     |   |                   |                    |             |              |              |
| Other         |      |      |     |   |                   |                    |             |              |              |
| Process       |      |      |     |   |                   |                    |             |              |              |
| Supplier      |      |      |     |   |                   |                    |             |              |              |
| Training      |      |      |     |   |                   |                    |             |              |              |
| Unapproved    |      |      |     |   |                   |                    |             |              |              |

**FAULT CATEGORY**

| Landing Gear  | General                                 | Other  |
|---|---|--|
| <input type="checkbox"/> Bending                      | <input type="checkbox"/> Bend           | <input type="checkbox"/> Grain                           |
| <input type="checkbox"/> Centre Not Concentric to O/S | <input type="checkbox"/> BOM/Route      | <input type="checkbox"/> Hardware                        |
| <input type="checkbox"/> Cracks                       | <input type="checkbox"/> Broken/Damaged | <input type="checkbox"/> Inspection Incomplete           |
| <input type="checkbox"/> Crushed/Crimped              | <input type="checkbox"/> Burrs          | <input type="checkbox"/> Instructions Incomplete/Unclear |
| <input type="checkbox"/> Cuffs                        | <input type="checkbox"/> Contamination  | <input type="checkbox"/> Maintenance                     |
| <input type="checkbox"/> Heat Treat                   | <input type="checkbox"/> Countersink    | <input type="checkbox"/> Mislabeled                      |
| <input type="checkbox"/> Inspection Strip in Tube     | <input type="checkbox"/> Cut Too Short  | <input type="checkbox"/> Misread                         |
| <input type="checkbox"/> Ripples in Bend              | <input type="checkbox"/> Drill Holes    | <input type="checkbox"/> Offset                          |
| <input type="checkbox"/> Torque Waves in Extrusion    | <input type="checkbox"/> Drawing        | <input type="checkbox"/> Out of Calibration              |
| <input type="checkbox"/> Turning Sequence             | <input type="checkbox"/> Finish         | <input type="checkbox"/> Out of Sequence                 |
| <input type="checkbox"/> Wave/Twist in Tube           | <input type="checkbox"/> Folio          | <input type="checkbox"/> Outside Dimensions              |
|   |   | <input type="checkbox"/> Ovalized                        |
|   |   | <input type="checkbox"/> Over/Under tolerance            |
|   |   | <input type="checkbox"/> Part Incorrect                  |
|   |   | <input type="checkbox"/> Part Lost/Missing               |
|   |   | <input type="checkbox"/> Part Moved                      |
|   |   | <input type="checkbox"/> Positioned Wrong                |
|   |   | <input type="checkbox"/> Power Loss/Surge                |
|   |   | <input type="checkbox"/> Pressure/Forced                 |
|   |   | <input type="checkbox"/> Temperature/Cure                |
|   |   | <input type="checkbox"/> Weld                            |
|   |   | <input type="checkbox"/> Wrong Stock Pulled              |
|   |   | <input type="checkbox"/> Other                           |

**Work Order ID 101939**

May-21-13 3:35:21 PM

**\*101939\***

Page 2

Item ID: D212-664-201TRN

Accept

**\*N900040100\***Setup Start **\*NS1\***

Revision ID:

Item Name: Crosstube Turning Detail

Stop **\*NS2\***

Start Date: 5/21/13 Start Qty: 1.00

**\*1\***

Cust Item ID:

Required Date: 6/04/13 Req'd Qty: 1.00

**\*1\***

Customer:

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_  
QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Run Start **\*NR1\***  
Stop **\*NR2\***

| Sequence ID/<br>Work Center ID | Operation<br>Description  | Set Up/<br>Run Hours | Tool ID | Tool # | Plan<br>Code | Accept<br>Qty | Reject<br>Qty | Reject<br>Number | Insp.<br>Stamp |
|--------------------------------|---|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|
| 120                            | MORI SEIKI CNC LATHE LARGE  | 0.00                 |         |        |              |               |               |                  |                |
| <b>*120*</b>                   |   |                      |         |        |              |               |               |                  |                |
| Mori Seiki                     | <b>Memo</b>   | 0.00                 |         |        |              |               |               |                  |                |
| Mori Seiki CNC Lathe Large     | 1-Turn second side as per Folio FA114   |                      |         |        |              |               |               |                  |                |
|                                | 2-Blend transition lines only, **do not sand whole tube**:<br>*Use mill bastard file, brush file repeatedly with file card.<br>*Do not use sandpaper coarser than 320 grit. |                      |         |        |              |               |               |                  |                |
|                                | FOLIO REV: <u>AD</u>  |                      |         |        |              |               |               |                  |                |
|                                | DWG REV: <u>AD</u>  |                      |         |        |              |               |               |                  |                |
|                                | 3-Remove sand and plugs   |                      |         |        |              |               |               |                  |                |
|                                | 4- scribe batch # and part # as per dwg   |                      |         |        |              |               |               |                  |                |
| 130                            | QC1- Inspect dimensions to dimension sheet  | 0.00                 |         |        |              |               |               |                  |                |
| <b>*130*</b>                   |   |                      |         |        |              |               |               |                  |                |
| QC                             | <b>Memo</b>   | 0.00                 |         |        |              |               |               |                  |                |
| Quality Control                |   |                      |         |        |              |               |               |                  |                |

1 ~~φ~~ KC / *gma* 13/06/07

1 ~~φ~~ KC 13-06-07

NCR: Yes / No

## WORK ORDER NON-CONFORMANCE / UPDATE

DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA Closed: \_\_\_\_\_ Date: \_\_\_\_\_

|  |   |  |                                      |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
|--|---|--|--------------------------------------|------------------------------------|------------------------------------|--------------------------------------|------------------------------------|------------------------------------|--|----------------------------------|--|------------------------------------|--|--------------------------------|------------------------------------|------------------------------------|-----------------------------------|--|
| Work Order: _____<br><br>Part No. _____<br><br>NCR No. _____ | <b>DISPOSITION</b><br><br>Rework <input type="checkbox"/><br>Scrap <input type="checkbox"/><br>Use-as-is <input type="checkbox"/><br>Work Order Update <input type="checkbox"/> | <b>AGAINST DEPARTMENT/PROCESS</b><br><br><table style="width:100%; border: none;"> <tr> <td>Skid-tube <input type="checkbox"/></td> <td>Crosstube <input type="checkbox"/></td> <td>Water Jet <input type="checkbox"/></td> <td>Engineering <input type="checkbox"/></td> </tr> <tr> <td>Machining <input type="checkbox"/></td> <td>Small Fab <input type="checkbox"/></td> <td>Prod. Eng. Coord. <input type="checkbox"/></td> <td>Quality <input type="checkbox"/></td> </tr> <tr> <td>Thermoforming <input type="checkbox"/></td> <td>Finishing <input type="checkbox"/></td> <td>Rec/Store/Packaging <input type="checkbox"/></td> <td>Other <input type="checkbox"/></td> </tr> <tr> <td>Large Fab <input type="checkbox"/></td> <td>Composite <input type="checkbox"/></td> <td>Supplier <input type="checkbox"/></td> <td></td> </tr> </table> | Skid-tube <input type="checkbox"/>   | Crosstube <input type="checkbox"/> | Water Jet <input type="checkbox"/> | Engineering <input type="checkbox"/> | Machining <input type="checkbox"/> | Small Fab <input type="checkbox"/> | Prod. Eng. Coord. <input type="checkbox"/> | Quality <input type="checkbox"/> | Thermoforming <input type="checkbox"/> | Finishing <input type="checkbox"/> | Rec/Store/Packaging <input type="checkbox"/> | Other <input type="checkbox"/> | Large Fab <input type="checkbox"/> | Composite <input type="checkbox"/> | Supplier <input type="checkbox"/> |  |
| Skid-tube <input type="checkbox"/>                           | Crosstube <input type="checkbox"/>  | Water Jet <input type="checkbox"/>   | Engineering <input type="checkbox"/> |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Machining <input type="checkbox"/>                           | Small Fab <input type="checkbox"/>  | Prod. Eng. Coord. <input type="checkbox"/>   | Quality <input type="checkbox"/>     |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Thermoforming <input type="checkbox"/>                       | Finishing <input type="checkbox"/>  | Rec/Store/Packaging <input type="checkbox"/>   | Other <input type="checkbox"/>       |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Large Fab <input type="checkbox"/>                           | Composite <input type="checkbox"/>  | Supplier <input type="checkbox"/>  |                                      |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |

| Root Cause    | Date | Step | Qty | Description of work order update or Non-conformance | Initial Chief Eng | Action Description | Sign & Date | Verification | QC Inspector |
|---------------|------|------|-----|---|-------------------|--------------------|-------------|--------------|--------------|
| Doc/Data      |      |      |     |   |                   |                    |             |              |              |
| Equip/Tooling |      |      |     |   |                   |                    |             |              |              |
| Operator      |      |      |     |   |                   |                    |             |              |              |
| Material      |      |      |     |   |                   |                    |             |              |              |
| Setup         |      |      |     |   |                   |                    |             |              |              |
| Other         |      |      |     |   |                   |                    |             |              |              |
| Process       |      |      |     |   |                   |                    |             |              |              |
| Supplier      |      |      |     |   |                   |                    |             |              |              |
| Training      |      |      |     |   |                   |                    |             |              |              |
| Unapproved    |      |      |     |   |                   |                    |             |              |              |

### FAULT CATEGORY

|   |   |   |
|---|---|---|
| <b>Landing Gear</b><br><input type="checkbox"/> Bending<br><input type="checkbox"/> Centre Not Concentric to O/S<br><input type="checkbox"/> Cracks<br><input type="checkbox"/> Crushed/Crimped<br><input type="checkbox"/> Cuffs<br><input type="checkbox"/> Heat Treat<br><input type="checkbox"/> Inspection Strip in Tube<br><input type="checkbox"/> Ripples in Bend<br><input type="checkbox"/> Torque Waves in Extrusion<br><input type="checkbox"/> Turning Sequence<br><input type="checkbox"/> Wave/Twist in Tube | <b>General</b><br><input type="checkbox"/> Bend<br><input type="checkbox"/> BOM/Route<br><input type="checkbox"/> Broken/Damaged<br><input type="checkbox"/> Burrs<br><input type="checkbox"/> Contamination<br><input type="checkbox"/> Countersink<br><input type="checkbox"/> Cut Too Short<br><input type="checkbox"/> Drill Holes<br><input type="checkbox"/> Drawing<br><input type="checkbox"/> Finish<br><input type="checkbox"/> Folio | <input type="checkbox"/> Grain<br><input type="checkbox"/> Hardware<br><input type="checkbox"/> Inspection Incomplete<br><input type="checkbox"/> Instructions Incomplete/Unclear<br><input type="checkbox"/> Maintenance<br><input type="checkbox"/> Mislabeled<br><input type="checkbox"/> Misread<br><input type="checkbox"/> Offset<br><input type="checkbox"/> Out of Calibration<br><input type="checkbox"/> Out of Sequence<br><input type="checkbox"/> Outside Dimensions |
|---|---|---|

|  |   |
|--|---|
| <input type="checkbox"/> Ovalized<br><input type="checkbox"/> Over/Under tolerance<br><input type="checkbox"/> Part Incorrect<br><input type="checkbox"/> Part Lost/Missing<br><input type="checkbox"/> Part Moved<br><input type="checkbox"/> Positioned Wrong<br><input type="checkbox"/> Power Loss/Surge | <input type="checkbox"/> Pressure/Forced<br><input type="checkbox"/> Temperature/Cure<br><input type="checkbox"/> Weld<br><input type="checkbox"/> Wrong Stock Pulled<br><br><input type="checkbox"/> Other |
|--|---|

# Work Order ID 101939

May-21-13 3:35:21 PM

**\*101939\***

Page 3

Item ID: D212-664-201TRN

Accept

**\*N900040100\***

Setup Start **\*NS1\***

Revision ID:

Item Name: Crosstube Turning Detail

Stop **\*NS2\***

Start Date: 5/21/13 Start Qty: 1.00

**\*1\***

Cust Item ID:

Required Date: 6/04/13 Req'd Qty: 1.00

**\*1\***

Customer:

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_  
QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Run Start **\*NR1\***

Stop **\*NR2\***

| Sequence ID/<br>Work Center ID | Operation<br>Description                                 | Set Up/<br>Run Hours | Tool ID | Tool # | Plan<br>Code | Accept<br>Qty | Reject<br>Qty | Reject<br>Number | Insp.<br>Stamp |
|--------------------------------|--|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|
| 140                            | QC8- Inspect parts - second check                        | 0.00                 |         |        |              |               |               |                  |                |
| <b>*140*</b>                   |  |                      |         |        |              |               |               |                  |                |
| QC                             | Memo   | 0.00                 |         |        |              |               |               |                  |                |
| Quality Control                |  |                      |         |        |              |               |               |                  |                |
| 145                            |  | 0.00                 |         |        |              |               |               |                  |                |
| <b>*145*</b>                   |  |                      |         |        |              |               |               |                  |                |
| Crosstubes                     | Memo   | 0.00                 |         |        |              |               |               |                  |                |
| Crosstubes                     | GRIND ONLY TRANSITION LINES SMOOTH LONGITUDE WAY.        |                      |         |        |              |               |               |                  |                |
| 150                            |  | 0.00                 |         |        |              |               |               |                  |                |
| <b>*150*</b>                   |  |                      |         |        |              |               |               |                  |                |
| HandFXtube                     | Memo   | 0.00                 |         |        |              |               |               |                  |                |
| Hand Finishing Crosstubes      | 1- PRESSURE WASH X-TUBE INSIDE AND OUT                   |                      |         |        |              |               |               |                  |                |
|                                | 2- ACID ETCH X-TUBE INSIDE AND OUT. USE RED SCOTCH BRITE |                      |         |        |              |               |               |                  |                |

*JW* 13-06-10

*EB/Lm* 13-06-26

*1* *φ*  
*MAN L*  
13/06/27

NCR: Yes / No

## WORK ORDER NON-CONFORMANCE / UPDATE

DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA Closed: \_\_\_\_\_ Date: \_\_\_\_\_

|  |   |   |                                      |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
|--|---|---|--------------------------------------|------------------------------------|------------------------------------|--------------------------------------|------------------------------------|------------------------------------|--|----------------------------------|--|------------------------------------|--|--------------------------------|------------------------------------|------------------------------------|-----------------------------------|--|
| Work Order: _____<br><br>Part No. _____<br><br>NCR No. _____ | <b>DISPOSITION</b><br><br>Rework <input type="checkbox"/><br>Scrap <input type="checkbox"/><br>Use-as-is <input type="checkbox"/><br>Work Order Update <input type="checkbox"/> | <b>AGAINST DEPARTMENT/PROCESS</b><br><br><table style="width: 100%;"> <tr> <td>Skid-tube <input type="checkbox"/></td> <td>Crosstube <input type="checkbox"/></td> <td>Water Jet <input type="checkbox"/></td> <td>Engineering <input type="checkbox"/></td> </tr> <tr> <td>Machining <input type="checkbox"/></td> <td>Small Fab <input type="checkbox"/></td> <td>Prod. Eng. Coord. <input type="checkbox"/></td> <td>Quality <input type="checkbox"/></td> </tr> <tr> <td>Thermoforming <input type="checkbox"/></td> <td>Finishing <input type="checkbox"/></td> <td>Rec/Store/Packaging <input type="checkbox"/></td> <td>Other <input type="checkbox"/></td> </tr> <tr> <td>Large Fab <input type="checkbox"/></td> <td>Composite <input type="checkbox"/></td> <td>Supplier <input type="checkbox"/></td> <td></td> </tr> </table> | Skid-tube <input type="checkbox"/>   | Crosstube <input type="checkbox"/> | Water Jet <input type="checkbox"/> | Engineering <input type="checkbox"/> | Machining <input type="checkbox"/> | Small Fab <input type="checkbox"/> | Prod. Eng. Coord. <input type="checkbox"/> | Quality <input type="checkbox"/> | Thermoforming <input type="checkbox"/> | Finishing <input type="checkbox"/> | Rec/Store/Packaging <input type="checkbox"/> | Other <input type="checkbox"/> | Large Fab <input type="checkbox"/> | Composite <input type="checkbox"/> | Supplier <input type="checkbox"/> |  |
| Skid-tube <input type="checkbox"/>                           | Crosstube <input type="checkbox"/>  | Water Jet <input type="checkbox"/>  | Engineering <input type="checkbox"/> |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Machining <input type="checkbox"/>                           | Small Fab <input type="checkbox"/>  | Prod. Eng. Coord. <input type="checkbox"/>  | Quality <input type="checkbox"/>     |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Thermoforming <input type="checkbox"/>                       | Finishing <input type="checkbox"/>  | Rec/Store/Packaging <input type="checkbox"/>  | Other <input type="checkbox"/>       |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |
| Large Fab <input type="checkbox"/>                           | Composite <input type="checkbox"/>  | Supplier <input type="checkbox"/>   |                                      |                                    |                                    |                                      |                                    |                                    |  |                                  |  |                                    |  |                                |                                    |                                    |                                   |  |

| Root Cause                             | Date | Step | Qty | Description of work order update or Non-conformance | Initial Chief Eng | Action Description | Sign & Date | Verification | QC Inspector |
|--|------|------|-----|---|-------------------|--------------------|-------------|--------------|--------------|
| Doc/Data <input type="checkbox"/>      |      |      |     |   |                   |                    |             |              |              |
| Equip/Tooling <input type="checkbox"/> |      |      |     |   |                   |                    |             |              |              |
| Operator <input type="checkbox"/>      |      |      |     |   |                   |                    |             |              |              |
| Material <input type="checkbox"/>      |      |      |     |   |                   |                    |             |              |              |
| Setup <input type="checkbox"/>         |      |      |     |   |                   |                    |             |              |              |
| Other <input type="checkbox"/>         |      |      |     |   |                   |                    |             |              |              |
| Process <input type="checkbox"/>       |      |      |     |   |                   |                    |             |              |              |
| Supplier <input type="checkbox"/>      |      |      |     |   |                   |                    |             |              |              |
| Training <input type="checkbox"/>      |      |      |     |   |                   |                    |             |              |              |
| Unapproved <input type="checkbox"/>    |      |      |     |   |                   |                    |             |              |              |

### FAULT CATEGORY

|   |   |   |
|---|---|---|
| <b>Landing Gear</b><br><input type="checkbox"/> Bending<br><input type="checkbox"/> Centre Not Concentric to O/S<br><input type="checkbox"/> Cracks<br><input type="checkbox"/> Crushed/Crimped<br><input type="checkbox"/> Cuffs<br><input type="checkbox"/> Heat Treat<br><input type="checkbox"/> Inspection Strip in Tube<br><input type="checkbox"/> Ripples in Bend<br><input type="checkbox"/> Torque Waves in Extrusion<br><input type="checkbox"/> Turning Sequence<br><input type="checkbox"/> Wave/Twist in Tube | <b>General</b><br><input type="checkbox"/> Bend<br><input type="checkbox"/> BOM/Route<br><input type="checkbox"/> Broken/Damaged<br><input type="checkbox"/> Burrs<br><input type="checkbox"/> Contamination<br><input type="checkbox"/> Countersink<br><input type="checkbox"/> Cut Too Short<br><input type="checkbox"/> Drill Holes<br><input type="checkbox"/> Drawing<br><input type="checkbox"/> Finish<br><input type="checkbox"/> Folio | <input type="checkbox"/> Grain<br><input type="checkbox"/> Hardware<br><input type="checkbox"/> Inspection Incomplete<br><input type="checkbox"/> Instructions Incomplete/Unclear<br><input type="checkbox"/> Maintenance<br><input type="checkbox"/> Mislabeled<br><input type="checkbox"/> Misread<br><input type="checkbox"/> Offset<br><input type="checkbox"/> Out of Calibration<br><input type="checkbox"/> Out of Sequence<br><input type="checkbox"/> Outside Dimensions |
|---|---|---|

|  |   |
|--|---|
| <input type="checkbox"/> Ovalized<br><input type="checkbox"/> Over/Under tolerance<br><input type="checkbox"/> Part Incorrect<br><input type="checkbox"/> Part Lost/Missing<br><input type="checkbox"/> Part Moved<br><input type="checkbox"/> Positioned Wrong<br><input type="checkbox"/> Power Loss/Surge | <input type="checkbox"/> Pressure/Forced<br><input type="checkbox"/> Temperature/Cure<br><input type="checkbox"/> Weld<br><input type="checkbox"/> Wrong Stock Pulled<br><input type="checkbox"/> Other |
|--|---|

# Work Order ID 101939

May-21-13 3:35:21 PM

**\*101939\***

Page 4

Item ID: D212-664-201TRN

Accept

**\*N9000040100\***

Setup Start **\*NS1\***

Revision ID:

Item Name: Crosstube Turning Detail

Stop **\*NS2\***

Start Date: 5/21/13 Start Qty: 1.00 **\*1\***

Cust Item ID:

Required Date: 6/04/13 Req'd Qty: 1.00 **\*1\***

Customer:

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

Run Start **\*NR1\***

QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop **\*NR2\***

| Sequence ID/<br>Work Center ID | Operation<br>Description                                 | Set Up/<br>Run Hours | Tool ID | Tool # | Plan<br>Code | Accept<br>Qty | Reject<br>Qty | Reject<br>Number | Insp.<br>Stamp |
|--------------------------------|--|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|
| 160                            | QC5- Inspect part completeness to step on W/O            | 0.00                 |         |        |              |               |               |                  |                |
| <b>*160*</b>                   |  |                      |         |        |              |               |               |                  |                |
| QC                             | Memo   | 0.00                 |         |        |              |               |               |                  |                |
| Quality Control                |  |                      |         |        |              |               |               |                  |                |
| 170                            | Packaging  | 0.00                 |         |        |              |               |               |                  |                |
| <b>*170*</b>                   |  |                      |         |        |              |               |               |                  |                |
| Packaging                      | Memo   | 0.00                 |         |        |              |               |               |                  |                |
| Packaging                      | Identify and stock in kanban rack<br>Location: <u>26</u> |                      |         |        |              |               |               |                  |                |
| 180                            | QC21- Final Inspection - Work Order Release              | 0.00                 |         |        |              |               |               |                  |                |
| <b>*180*</b>                   |  |                      |         |        |              |               |               |                  |                |
| QC                             | Memo   | 0.00                 |         |        |              |               |               |                  |                |
| Quality Control                |  |                      |         |        |              |               |               |                  |                |



13-7-3

13-0703

13/7/4

MF  
13-74

NCR: Yes / No

**WORK ORDER NON-CONFORMANCE / UPDATE**

DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA Closed: \_\_\_\_\_ Date: \_\_\_\_\_

|  |      |      |     |   |                   |   |             |              |              |  |  |
|--|------|------|-----|---|-------------------|---|-------------|--------------|--------------|--|--|
| Work Order: _____<br><br>Part No. _____<br><br>NCR No. _____ |      |      |     | <b>DISPOSITION</b><br><br>Rework <input type="checkbox"/><br>Scrap <input type="checkbox"/><br>Use-as-is <input type="checkbox"/><br>Work Order Update <input type="checkbox"/> |                   | <b>AGAINST DEPARTMENT/PROCESS</b><br><br><div style="display: flex; justify-content: space-between;"> <div>           Skid-tube <input type="checkbox"/><br/>           Machining <input type="checkbox"/><br/>           Thermoforming <input type="checkbox"/><br/>           Large Fab <input type="checkbox"/> </div> <div>           Crosstube <input type="checkbox"/><br/>           Small Fab <input type="checkbox"/><br/>           Finishing <input type="checkbox"/><br/>           Composite <input type="checkbox"/> </div> <div>           Water Jet <input type="checkbox"/><br/>           Prod. Eng. Coord. <input type="checkbox"/><br/>           Rec/Store/Packaging <input type="checkbox"/><br/>           Supplier <input type="checkbox"/> </div> <div>           Engineering <input type="checkbox"/><br/>           Quality <input type="checkbox"/><br/>           Other <input type="checkbox"/> </div> </div> |             |              |              |  |  |
| Root Cause   | Date | Step | Qty | Description of work order update or Non-conformance   | Initial Chief Eng | Action Description  | Sign & Date | Verification | QC Inspector |  |  |
| Doc/Data   |      |      |     |   |                   |   |             |              |              |  |  |
| Equip/Tooling  |      |      |     |   |                   |   |             |              |              |  |  |
| Operator   |      |      |     |   |                   |   |             |              |              |  |  |
| Material   |      |      |     |   |                   |   |             |              |              |  |  |
| Setup  |      |      |     |   |                   |   |             |              |              |  |  |
| Other  |      |      |     |   |                   |   |             |              |              |  |  |
| Process  |      |      |     |   |                   |   |             |              |              |  |  |
| Supplier   |      |      |     |   |                   |   |             |              |              |  |  |
| Training   |      |      |     |   |                   |   |             |              |              |  |  |
| Unapproved   |      |      |     |   |                   |   |             |              |              |  |  |

| FAULT CATEGORY  |   |   |   |  |
|---|---|---|---|--|
| <b>Landing Gear</b><br><input type="checkbox"/> Bending<br><input type="checkbox"/> Centre Not Concentric to O/S<br><input type="checkbox"/> Cracks<br><input type="checkbox"/> Crushed/Crimped<br><input type="checkbox"/> Cuffs<br><input type="checkbox"/> Heat Treat<br><input type="checkbox"/> Inspection Strip in Tube<br><input type="checkbox"/> Ripples in Bend<br><input type="checkbox"/> Torque Waves in Extrusion<br><input type="checkbox"/> Turning Sequence<br><input type="checkbox"/> Wave/Twist in Tube | <b>General</b><br><input type="checkbox"/> Bend<br><input type="checkbox"/> BOM/Route<br><input type="checkbox"/> Broken/Damaged<br><input type="checkbox"/> Burrs<br><input type="checkbox"/> Contamination<br><input type="checkbox"/> Countersink<br><input type="checkbox"/> Cut Too Short<br><input type="checkbox"/> Drill Holes<br><input type="checkbox"/> Drawing<br><input type="checkbox"/> Finish<br><input type="checkbox"/> Folio | <input type="checkbox"/> Grain<br><input type="checkbox"/> Hardware<br><input type="checkbox"/> Inspection Incomplete<br><input type="checkbox"/> Instructions Incomplete/Unclear<br><input type="checkbox"/> Maintenance<br><input type="checkbox"/> Mislabeled<br><input type="checkbox"/> Misread<br><input type="checkbox"/> Offset<br><input type="checkbox"/> Out of Calibration<br><input type="checkbox"/> Out of Sequence<br><input type="checkbox"/> Outside Dimensions | <input type="checkbox"/> Ovalized<br><input type="checkbox"/> Over/Under tolerance<br><input type="checkbox"/> Part Incorrect<br><input type="checkbox"/> Part Lost/Missing<br><input type="checkbox"/> Part Moved<br><input type="checkbox"/> Positioned Wrong<br><input type="checkbox"/> Power Loss/Surge<br><br><input type="checkbox"/> Pressure/Forced<br><input type="checkbox"/> Temperature/Cure<br><input type="checkbox"/> Weld<br><input type="checkbox"/> Wrong Stock Pulled<br><br><input type="checkbox"/> Other |  |



# Picklist Print

May-21-13 3:35:24 PM

Page 1

Work Order ID: 101939

\*101939\*

Parent Item: D212-664-201TRN

\*D212-664-201TRN\*

Parent Item Name: Crosstube Turning Detail

Start Date: 5/21/13

Required Date: 6/04/13

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev:A 08-03-06 new issue DD verified by:ec  
IPP Rev B 08.04.02 Removed polish EC verified DD

| Component Item ID/<br>Item Name | Replacement<br>Item ID | Mfg/<br>Purch | Bin<br>Item | Primary<br>Location | Last<br>Location | Route<br>Seq ID | Unit of<br>Measure | Qty on<br>Hand | Qty per Kit | Total<br>Qty | Qty<br>Issued | Date<br>Issued | Status |
|---------------------------------|------------------------|---------------|-------------|---------------------|------------------|-----------------|--------------------|----------------|-------------|--------------|---------------|----------------|--------|
| D6006-129                       |                        | Manufactured  | No          |                     |                  | 120             | Each               | 8.0000         | 1           | 1            |               |                |        |
| *D6006-129*                     |                        |               |             |                     |                  |                 |                    |                | **          |              |               |                |        |
| Crosstube Material              |                        |               |             |                     |                  |                 |                    |                |             |              |               |                |        |

Location

Loc Qty

Loc Code

LG015

8

69838

2

75633

6

— t — Mon. 6/13/05/2013

NCR: Yes / No

**WORK ORDER NON-CONFORMANCE / UPDATE**

DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA Closed: \_\_\_\_\_ Date: \_\_\_\_\_

|   |      |      |   |   |                   |   |             |              |   |  |  |
|---|------|------|---|---|-------------------|---|-------------|--------------|---|--|--|
| Work Order: _____<br><br>Part No. _____<br><br>NCR No. _____  |      |      |   | <b>DISPOSITION</b><br><br>Rework <input type="checkbox"/><br>Scrap <input type="checkbox"/><br>Use-as-is <input type="checkbox"/><br>Work Order Update <input type="checkbox"/> |                   | <b>AGAINST DEPARTMENT/PROCESS</b><br><br><div style="display: flex; justify-content: space-between;"> <div>           Skid-tube <input type="checkbox"/><br/>           Machining <input type="checkbox"/><br/>           Thermoforming <input type="checkbox"/><br/>           Large Fab <input type="checkbox"/> </div> <div>           Crosstube <input type="checkbox"/><br/>           Small Fab <input type="checkbox"/><br/>           Finishing <input type="checkbox"/><br/>           Composite <input type="checkbox"/> </div> <div>           Water Jet <input type="checkbox"/><br/>           Prod. Eng. Coord. <input type="checkbox"/><br/>           Rec/Store/Packaging <input type="checkbox"/><br/>           Supplier <input type="checkbox"/> </div> <div>           Engineering <input type="checkbox"/><br/>           Quality <input type="checkbox"/><br/>           Other <input type="checkbox"/> </div> </div> |             |              |   |  |  |
| Root Cause  | Date | Step | Qty   | Description of work order update or Non-conformance   | Initial Chief Eng | Action Description  | Sign & Date | Verification | QC Inspector  |  |  |
| Doc/Data <input type="checkbox"/>   |      |      |   |   |                   |   |             |              |   |  |  |
| Equip/Tooling <input type="checkbox"/>  |      |      |   |   |                   |   |             |              |   |  |  |
| Operator <input type="checkbox"/>   |      |      |   |   |                   |   |             |              |   |  |  |
| Material <input type="checkbox"/>   |      |      |   |   |                   |   |             |              |   |  |  |
| Setup <input type="checkbox"/>  |      |      |   |   |                   |   |             |              |   |  |  |
| Other <input type="checkbox"/>  |      |      |   |   |                   |   |             |              |   |  |  |
| Process <input type="checkbox"/>  |      |      |   |   |                   |   |             |              |   |  |  |
| Supplier <input type="checkbox"/>   |      |      |   |   |                   |   |             |              |   |  |  |
| Training <input type="checkbox"/>   |      |      |   |   |                   |   |             |              |   |  |  |
| Unapproved <input type="checkbox"/>   |      |      |   |   |                   |   |             |              |   |  |  |
| <b>FAULT CATEGORY</b>   |      |      |   |   |                   |   |             |              |   |  |  |
| <b>Landing Gear</b><br><input type="checkbox"/> Bending<br><input type="checkbox"/> Centre Not Concentric to O/S<br><input type="checkbox"/> Cracks<br><input type="checkbox"/> Crushed/Crimped<br><input type="checkbox"/> Cuffs<br><input type="checkbox"/> Heat Treat<br><input type="checkbox"/> Inspection Strip in Tube<br><input type="checkbox"/> Ripples in Bend<br><input type="checkbox"/> Torque Waves in Extrusion<br><input type="checkbox"/> Turning Sequence<br><input type="checkbox"/> Wave/Twist in Tube |      |      | <b>General</b><br><input type="checkbox"/> Bend<br><input type="checkbox"/> BOM/Route<br><input type="checkbox"/> Broken/Damaged<br><input type="checkbox"/> Burrs<br><input type="checkbox"/> Contamination<br><input type="checkbox"/> Countersink<br><input type="checkbox"/> Cut Too Short<br><input type="checkbox"/> Drill Holes<br><input type="checkbox"/> Drawing<br><input type="checkbox"/> Finish<br><input type="checkbox"/> Folio |   |                   | <input type="checkbox"/> Grain<br><input type="checkbox"/> Hardware<br><input type="checkbox"/> Inspection Incomplete<br><input type="checkbox"/> Instructions Incomplete/Unclear<br><input type="checkbox"/> Maintenance<br><input type="checkbox"/> Mislabeled<br><input type="checkbox"/> Misread<br><input type="checkbox"/> Offset<br><input type="checkbox"/> Out of Calibration<br><input type="checkbox"/> Out of Sequence<br><input type="checkbox"/> Outside Dimensions   |             |              | <input type="checkbox"/> Ovalized<br><input type="checkbox"/> Over/Under tolerance<br><input type="checkbox"/> Part Incorrect<br><input type="checkbox"/> Part Lost/Missing<br><input type="checkbox"/> Part Moved<br><input type="checkbox"/> Positioned Wrong<br><input type="checkbox"/> Power Loss/Surge<br><br><input type="checkbox"/> Pressure/Forced<br><input type="checkbox"/> Temperature/Cure<br><input type="checkbox"/> Weld<br><input type="checkbox"/> Wrong Stock Pulled<br><br><input type="checkbox"/> Other |  |  |

|   |                                  |
|---|----------------------------------|
| <b>DART AEROSPACE LTD</b>                                 | <b>Work Order:</b> 101939        |
| <b>Description:</b> Crosstube Assembly (205/212 High Aft) | <b>Part Number:</b> D212-664-241 |
| <b>Inspection Dwg:</b> D212-664-241 <b>Rev:</b> D         | <b>Page 1 of 2</b>               |

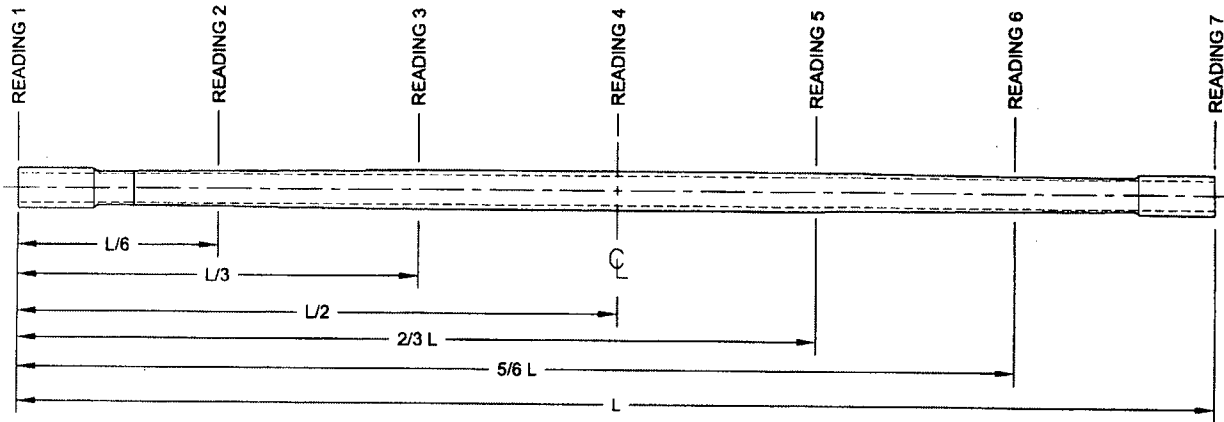
### FIRST ARTICLE INSPECTION CHECKLIST

| Inspection Sheet<br>Drawing Dimension | Tolerance | Actual<br>Dimension | Accept  | Reject | Method of<br>Inspection | Comments |
|---------------------------------------|-----------|---------------------|---------|--------|-------------------------|----------|
| SIDE A                                | 0.200     | +/-0.010            | 2.200   | /      |                         |          |
|                                       | R0.063    | +/-0.010            | .063    | /      | VERN                    | CNC-08   |
|                                       | 2.990     | +0.005/-0.000       | 2.991   | /      | RL                      |          |
|                                       | 5.237     | +/-0.030            | 5.270   | /      | VERN                    | CNC-08   |
|                                       | 2.600     | +0.005/-0.000       | 2.603   | /      |                         |          |
|                                       | 2.686     | +0.005/-0.000       | 2.689   | /      |                         |          |
|                                       | 2.770     | +0.005/-0.000       | 2.775   | /      |                         |          |
|                                       | 2.854     | +0.005/-0.000       | 2.857   | /      |                         |          |
|                                       | 2.938     | +0.005/-0.000       | 2.941   | /      |                         |          |
|                                       | 3.021     | +0.005/-0.000       | 3.024   | /      |                         |          |
|                                       | 3.133     | +0.005/-0.000       | 3.136   | /      |                         |          |
|                                       | 3.179     | +0.005/-0.000       | 3.182   | /      |                         |          |
|                                       |           |                     |         |        |                         |          |
|                                       |           |                     |         |        |                         |          |
| SIDE B                                | 0.200     | +/-0.010            | .200    | /      | VERN                    | CNC-08   |
|                                       | R0.063    | +/-0.010            | .063    | /      | RL                      |          |
|                                       | 2.990     | +0.005/-0.000       | 2.992   | /      | VERN                    | CNC-08   |
|                                       | 5.237     | +/-0.030            | 5.249   | /      |                         |          |
|                                       | 2.600     | +0.005/-0.000       | 2.603   | /      |                         |          |
|                                       | 2.686     | +0.005/-0.000       | 2.689   | /      |                         |          |
|                                       | 2.770     | +0.005/-0.000       | 2.775   | /      |                         |          |
|                                       | 2.854     | +0.005/-0.000       | 2.857   | /      |                         |          |
|                                       | 2.938     | +0.005/-0.000       | 2.941   | /      |                         |          |
|                                       | 3.021     | +0.005/-0.000       | 3.024   | /      |                         |          |
|                                       | 3.133     | +0.005/-0.000       | 3.136   | /      |                         |          |
|                                       | 3.179     | +0.005/-0.000       | 3.182   | /      |                         |          |
|                                       | 124.362   | +/-0.020            | 124.365 | /      | tape                    | LG-5     |
|                                       |           |                     |         |        |                         |          |
|                                       |           |                     |         |        |                         |          |



|   |                     |                     |
|---|---------------------|---------------------|
| <b>DART AEROSPACE LTD</b>                                 | <b>Work Order:</b>  | <u>101939</u>       |
| <b>Description:</b> Crosstube Assembly (205/212 High Aft) | <b>Part Number:</b> | <b>D212-664-241</b> |
| <b>Inspection Dwg:</b> D212-664-241 <b>Rev:</b> D         |                     | <b>Page 2 of 2</b>  |

### WALL THICKNESS MEASUREMENT



| Location                 | WALL THICKNESS MEASUREMENT (IN) |      |      |      | Deviation<br>$\Delta w$<br>(max-min) | TOLERANCE |
|--------------------------|---------------------------------|------|------|------|--------------------------------------|-----------|
|                          | w1                              | w2   | w3   | w4   |                                      |           |
| READING 1<br>L = 0"      | .380                            | .362 | .402 | .388 | .022                                 | 0.062"    |
| READING 2<br>L = 20.727  | .314                            | .317 | .316 | .310 | .007                                 |           |
| READING 3<br>L = 41.454  | .487                            | .484 | .476 | .480 | .011                                 |           |
| READING 4<br>L = 62.181  | .530                            | .524 | .503 | .516 | .027                                 |           |
| READING 5<br>L = 82.908  | .486                            | .494 | .469 | .471 | .025                                 |           |
| READING 6<br>L = 103.635 | .326                            | .330 | .295 | .296 | .035                                 |           |
| READING 7<br>L = 124.362 | .395                            | .400 | .382 | .379 | .021                                 |           |

#### Calibration Result

Actual Block Thickness: 100-730

SITESCAN 250 Measured Thickness: 100-750

|                               |                                       |                              |
|-------------------------------|---------------------------------------|------------------------------|
| <b>Measured by:</b> <u>KC</u> | <b>Audited by:</b> <u>[Signature]</u> | <b>Preliminary Approval:</b> |
| <b>Date:</b> <u>13-6-08</u>   | <b>Date:</b> <u>13-06-10</u>          | <b>Date:</b>                 |

| Rev | Date     | Change                           | Revised by | Approved           |
|-----|----------|----------------------------------|------------|--------------------|
| A   | 05.04.27 | New Issue (P/O D412-664-201)     | KJ/JLM     |                    |
| B   | 06.03.09 | Tolerance for 5.237 was +/-0.001 | KJ/JLM     |                    |
| C   | 07.05.08 | Dwg Rev. updated                 | KJ/JLM     |                    |
| D   | 10.08.03 | Dimension 124.362 was 124.36     | KJ         |                    |
| E   | 12.06.04 | Wall thickness form added        | KJ         | <u>[Signature]</u> |



| Item | Qty<br>-241 | Qty<br>-241B | Part Number    | Description   |
|------|-------------|--------------|----------------|---|
| 1    | X           |              | D212-664-241   | CROSSTUBE ASSEMBLY (205/212 HIGH AFT)   |
| 2    |             | X            | D212-664-241B  | CROSSTUBE ASSEMBLY (214 HIGH AFT)   |
| 3    | 1           | 1            | D6006-129      | CROSSTUBE   |
| 4    | 2           | 2            | D2940-1        | SUPPORT   |
| 5    | 4           | 4            | D3595-063-530  | RUBBER CUSHION  |
| 6    | 4           | 4            | MS21920-28     | CLAMP (OR MS21920-30)   |
| 7    | A/R         | A/R          | MAGNOBOND 6398 | ROCKWELL SPECIFICATION RBO-120-023<br>ADHESIVE (TEXTRON/BELL SPEC. 299-947-100,<br>TYPE II, CLASS 2 ADHESIVE) |

# **GENERAL NOTES:**

- 1) MATERIAL: MANUFACTURED FROM D6006-129  
FINISHED LENGTH = 124.362±0.020
- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: SCRIBE DART PART NUMBER "D212-664-XXX" AND BATCH NUMBER ON INSIDE OF CUFF USING VIBRATING STYLUS.
- 7) WEIGHT: D212-664-241 = 44.2 lbs (PER IIN-D212-664)  
D212-664-241B = 44.2 lbs (PER IIN-D212-664)
- 8) PART IS SYMMETRIC ABOUT CENTERLINE.
- 9) RUN CUTTER OFF PART. BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 5 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 11) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 12) INSTALL D2940-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2940-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 13) INSTALL MS21920-28 CLAMPS (OR -30) WITH D3595-063-530 RUBBER CUSHIONS TO SECURE THE D2940-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE OF CROSSTUBE SUPPORT.
- 14) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 15) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

101939 MLT  
13-05-22  
COPY  
NT

600 #11-614  
11.08.25  
UNDER REVIEW  
11.08.13

DEO ATTACHED

RELEASED  
2009-10-29

|            |   |   |              |
|------------|---|---|--------------|
| D          | REFORMAT/REVISE GENERAL NOTES/PART LIST;<br>REORGANIZED VIEWS AND REFORMATTED DRAWING<br>TO CURRENT STANDARDS; ADD -241B (ZN D4-2, B4-2);<br>REMOVED REF & ADD TOLERANCES (ZN D8-3 & C4-3,<br>C6-3 & A8-3); RELOCATED FLAG #6 PER PAR 08-046 (ZN<br>A5-3); MOVED TURNING DETAIL & UPDATED TOLERANCE<br>TO SHEET 4 | RF  | 09.09.30     |
| C          | REMOVE -1009 ABRASION STRIP; ADD MAGNOBOND<br>6398, CUSHION, REVERSE CLAMPS   | PH  | 07.03.08     |
| B          | ADD HOLES FOR COMPATABILITY WITH BHT/AA<br>SKIDTUBES  | PH  | 05.02.04     |
| A          | NEW ISSUE   | PH  | 00.12.12     |
| REV.       | DESCRIPTION   | BY  | DATE         |
| DESIGN     | PH  | <b>DART AEROSPACE LTD</b><br>HAWKESBURY, ONTARIO, CANADA  |              |
| DRAWN      | RF  |   |              |
| CHECKED    | PH  | DRAWING NO.   | REV. D       |
| MFG. APPR. | PH  | D212-664-241  | SHEET 1 OF 4 |
| APPROVED   | PH  | TITLE   | SCALE        |
| DE APPR.   | PH  | CROSSTUBE ASSY (205/212 HI AFT)   | NTS          |
| DATE       | 09.09.30  | COPYRIGHT © 2008 BY DART AEROSPACE LTD<br>THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL, AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS<br>NOT TO BE USED FOR ANY PURPOSE OR COMMUNICATED TO ANY OTHER PERSON WITHOUT<br>WRITTEN PERMISSION FROM DART AEROSPACE LTD. |              |





101939

12 13 15  
D2940-1 SUPPORT  
MS21920-28 CLAMP, 2X  
D3595-063-530 RUBBER CUSHION, 2X  
2 PL

14.00 (-241)  
OR 13.75 (-241B) D

D212-664-601  
BENT TUBE

CL  
SYM

**D212-664-241/-241B**  
**ASSEMBLY DETAIL** D

ECN #11-614  
11.07.26  
**UNDER REVIEW**  
*[Signature]*

**DEO ATTACHED**

**RELEASED**  
2009-10-28  
*[Signature]*

12  
APPLY MAGNOBOND  
BETWEEN D2940-1 AND  
CROSSTUBE

D2940-1 SUPPORT, REF

13 15  
MS21920-28  
CLAMP, REF

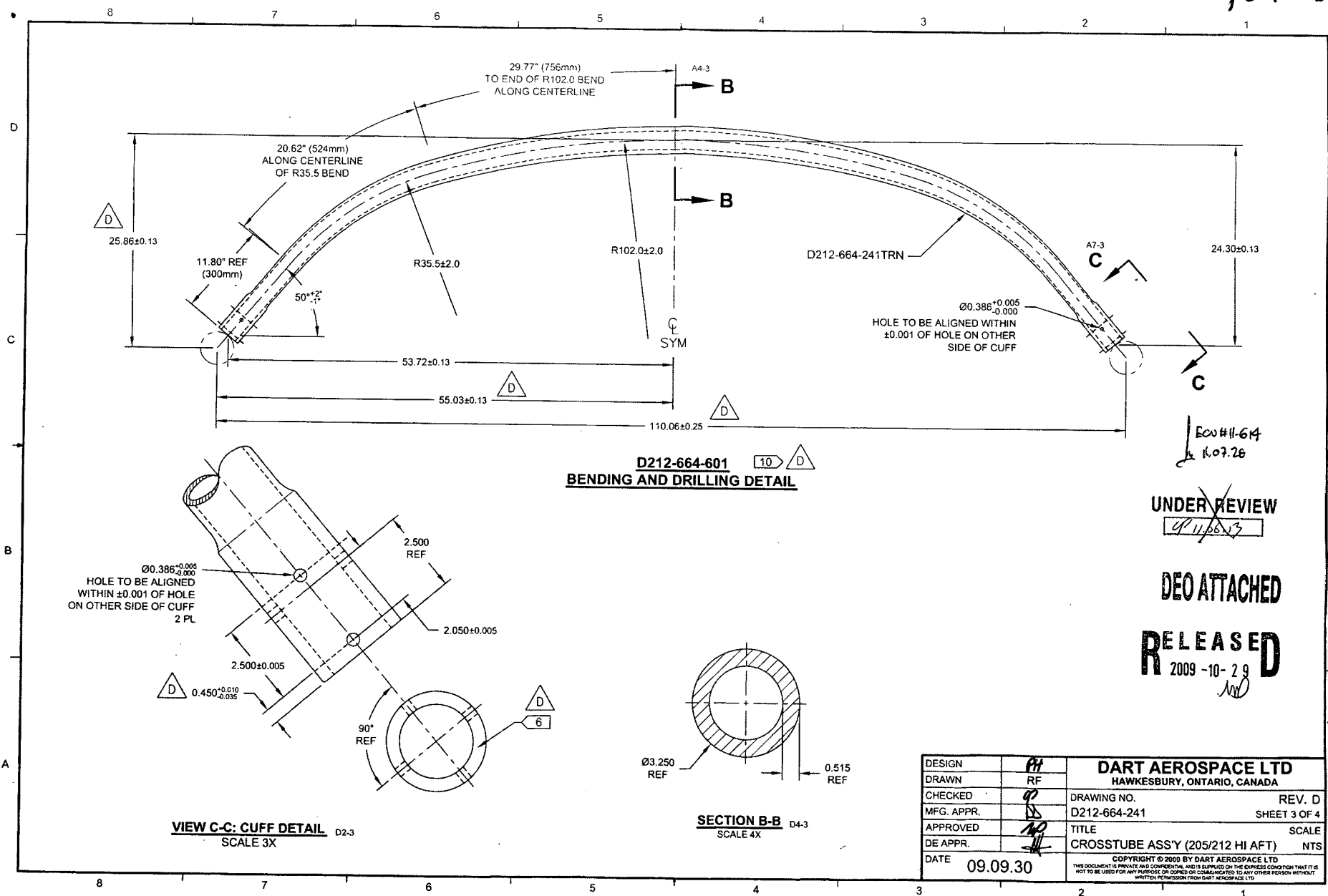
D3595-063-530 RUBBER CUSHION  
UNDER CLAMP, REF

**SECTION A-A** D6-2  
SCALE 4X

|            |          |  |              |
|------------|----------|--|--------------|
| DESIGN     | PH       | <b>DART AEROSPACE LTD</b>  |              |
| DRAWN      | RF       | HAWKESBURY, ONTARIO, CANADA  |              |
| CHECKED    | GP       | DRAWING NO.  | REV. D       |
| MFG. APPR. | DS       | D212-664-241   | SHEET 2 OF 4 |
| APPROVED   | AD       | TITLE  | SCALE        |
| DE APPR.   | HL       | CROSSTUBE ASS'Y (205/212 HI AFT)   | NTS          |
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101939



ECU #11-614  
K.07.26

UNDER REVIEW  
11/11/03

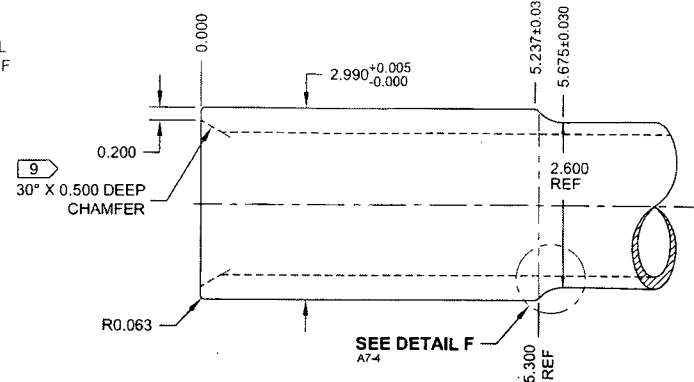
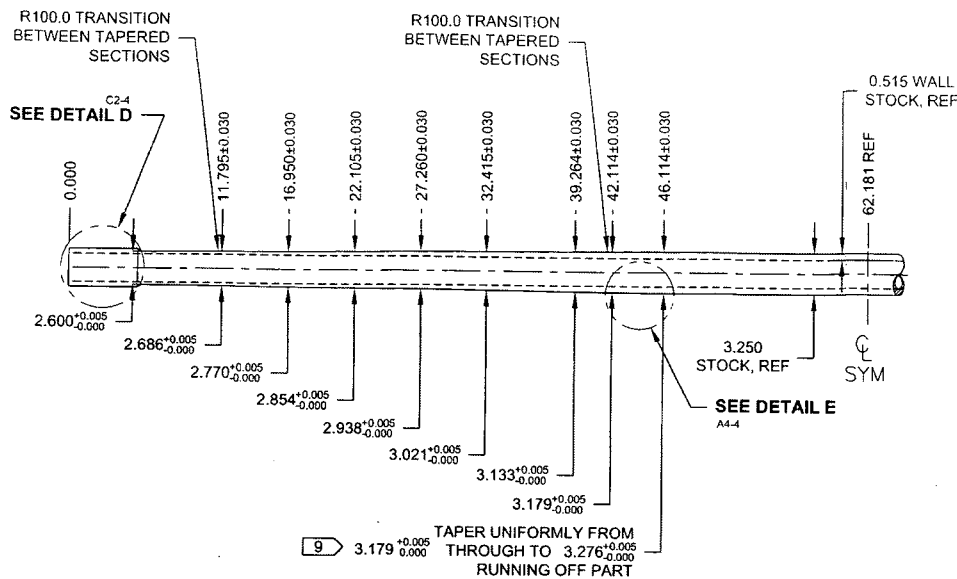
DEO ATTACHED

RELEASED  
2009-10-29

|            |          |   |              |
|------------|----------|---|--------------|
| DESIGN     | PH       | <b>DART AEROSPACE LTD</b><br>HAWKESBURY, ONTARIO, CANADA  |              |
| DRAWN      | RF       |   |              |
| CHECKED    | Q        | DRAWING NO.   | REV. D       |
| MFG. APPR. | JS       | D212-664-241  | SHEET 3 OF 4 |
| APPROVED   | JS       | TITLE   | SCALE        |
| DE APPR.   | JS       | CROSSTUBE ASS'Y (205/212 HI AFT)  | NTS          |
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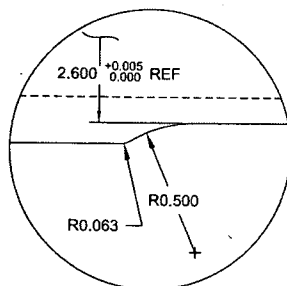


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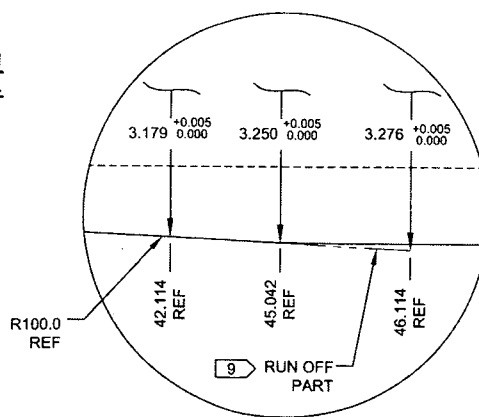


DETAIL D:  
 CROSSTUBE CUFF  
 SCALE 5X D8-4

D212-664-241TRN  
 TURNING DETAIL



DETAIL F:  
 CUFF TRANSITION  
 SCALE 10X C2-4



DETAIL E:  
 TAPER RUN-OFF  
 NOT TO SCALE C5-4

200811-614  
 11.07.28  
 UNDER REVIEW  
 09/10/13

DEO ATTACHED

RELEASED  
 2009-10-29

|            |          |   |              |
|------------|----------|---|--------------|
| DESIGN     | PH       | DART AEROSPACE LTD  |              |
| DRAWN      | RF       | HAWKESBURY, ONTARIO, CANADA   |              |
| CHECKED    | 9        | DRAWING NO.   | REV. D       |
| MFG. APPR. | 9        | D212-664-241  | SHEET 4 OF 4 |
| APPROVED   | 10       | TITLE   | SCALE        |
| DE APPR.   | 11       | CROSSTUBE ASSY (205/212 HI AFT)   | NTS          |
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|                             |  |               |   |               |                                |                           |              |
|-----------------------------|--|---------------|---|---------------|--------------------------------|---------------------------|--------------|
| DRAWING NO.<br>D212-664-241 | TITLE<br>CROSSTUBE ASSY (205/212 HI AFT) | REV. D        | <b>DART AEROSPACE LTD<br/>ENGINEERING ORDER</b> |               | D.E.O. NO.<br>D212-664-241-D-1 | SHEET NO.<br>SHEET 1 OF 2 | SCALE<br>NTS |
| DRAWN                       | CHECKED                                  | MFG. APPR.    | APPROVED  | DE APPR.      |                                |                           |              |
| DATE 11.04.07               | DATE 11.04.11                            | DATE 11.04.12 | DATE 11/04/12                                   | DATE 11.04.12 |                                |                           |              |

**PURPOSE:**

ADD AN INSPECTION WINDOW TO UNDERSIDE OF CROSSTUBE.

**CHANGE:**

NOTES 2 OF SHEET 1 IS AMENDED AS FOLLOWS:

**IS:**

- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
MASK UNDERSIDE OF CROSSTUBE AS SHOWN (HATCHED AREA) AND  
PAINT OUTSIDE PER DART QSI 005 4.2  
REMOVE MASKING AND APPLY CLEAR COAT

**WAS:**

- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART QSI 005 4.2

RELEASED  
2011-04-18

UNDER REVIEW

11.06.13

ECN#1-614

11.07.20

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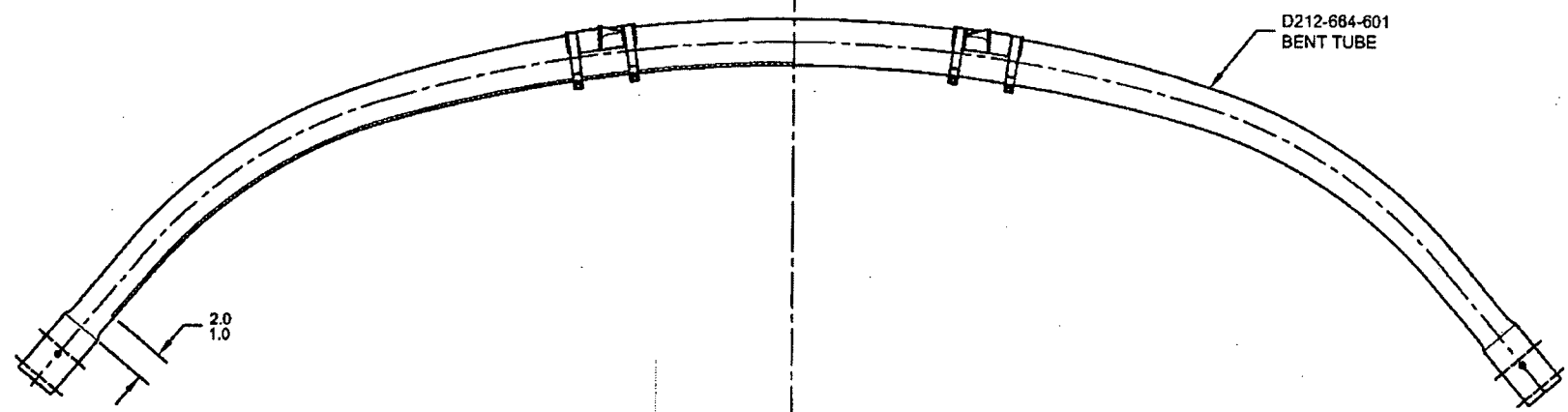


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|                             |  |                     |   |                                |                           |              |
|-----------------------------|--|---------------------|---|--------------------------------|---------------------------|--------------|
| DRAWING NO.<br>D212-664-241 | TITLE<br>CROSSTUBE ASSY (205/212 HI AFT) | REV. D              | DART AEROSPACE LTD<br>ENGINEERING ORDER | D.E.O. NO.<br>D212-664-241-D-1 | SHEET NO.<br>SHEET 2 OF 2 | SCALE<br>NTS |
| DRAWN                       | CHECKED <i>UP</i>                        | MFG. APPR. <i>E</i> | APPROVED <i>MD</i>                      | DE APPR. <i>MD</i>             |                           |              |
| DATE 11.04.07               | DATE 11.04.11                            | DATE 11.04.12       | DATE 11/04/12                           | DATE 11.04.12                  |                           |              |

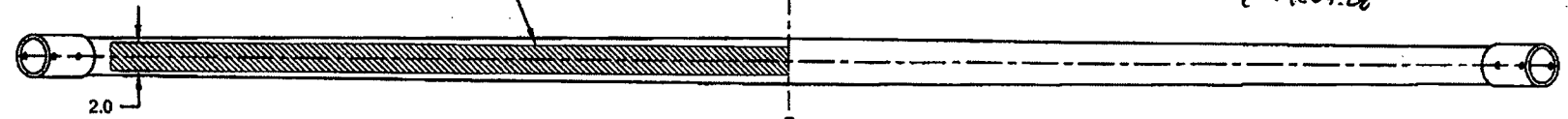
IS:

WAS:



D212-664-241/-241B  
ASSEMBLY DETAIL

MASK AREA PRIOR TO PAINTING,  
REMOVE MASKING AFTER PAINT  
AND APPLY CLEAR COAT



C  
SYM

**RELEASED**  
2011-04-18

**UNDER REVIEW**

*UP* 11.06.13  
D212-664-241  
11.03.28

101939

|                             |   |                      |   |                    |                                |                           |              |
|-----------------------------|---|----------------------|---|--------------------|--------------------------------|---------------------------|--------------|
| DRAWING NO.<br>D212-664-241 | TITLE<br>CROSSTUBE ASS'Y (205/212 HI AFT) | REV. D               | <b>DART AEROSPACE LTD<br/>ENGINEERING ORDER</b> |                    | D.E.O. NO.<br>D212-664-241-D-2 | SHEET NO.<br>SHEET 1 OF 1 | SCALE<br>NTS |
| DRAWN <i>q</i>              | CHECKED <i>ASS</i>                        | MFG. APPR. <i>DS</i> | APPROVED <i>MP</i>                              | DE APPR. <i>MP</i> |                                |                           |              |
| DATE 11.07.15               | DATE 11.07.20                             | DATE 11.07.21        | DATE 11/07/21                                   | DATE 11.07.21      |                                |                           |              |

**PURPOSE:**

REPLACE MAGNOBOND WITH PROSEAL.

**CHANGE:**

IS:

| Item | Qty<br>-241 | Qty<br>-241B | Part Number     | Description                   |
|------|-------------|--------------|-----------------|-------------------------------|
| 7    | A/R         | A/R          | PROSEAL 890 B-2 | SEALANT, AMS-S-8802 CLASS B-2 |

WAS:

|   |     |     |                |   |
|---|-----|-----|----------------|---|
| 7 | A/R | A/R | MAGNOBOND 6398 | ROCKWELL SPECIFICATION RBO-120-023<br>ADHESIVE (TEXTRON/BELL SPEC. 299-947-100,<br>TYPE II, CLASS 2 ADHESIVE) |
|---|-----|-----|----------------|---|

NOTE 12 & 15, SHEET 1 IS AMENDED AS FOLLOWS:

IS:

- 12) TO INSTALL D2940-1 SUPPORT: ABRASE MATING SURFACE OF SUPPORT AND CROSSTUBE WITH 180-GRIT SANDPAPER AND REMOVE RESIDUE WITH MEK (OR EQUIVALENT). APPLY A 0.04" TO 0.07" THICK LAYER OF PROSEAL 890 CLASS B-2 (OR AMS-S-8802 CLASS B-2) SEALANT TO MATING SURFACE OF SUPPORT.
- 15) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. **PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER PROSEAL 890 SEALANT HAS CURED FOR 72 HOURS.**

WAS:

- 12) INSTALL D2940-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2940-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 15) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

**RELEASED**  
2011-07-28  
*W*